

Hypopharyngeal Dilatation in Musicians

Etiology and Treatment

Richard Smith, M.D., and Howard Levine, M.D.

An unusual case of massive hypopharyngeal dilatation in a 16-year-old trumpet player prompted a review of the literature concerning laryngoceles and pharyngeal diverticula with particular emphasis on the causes and

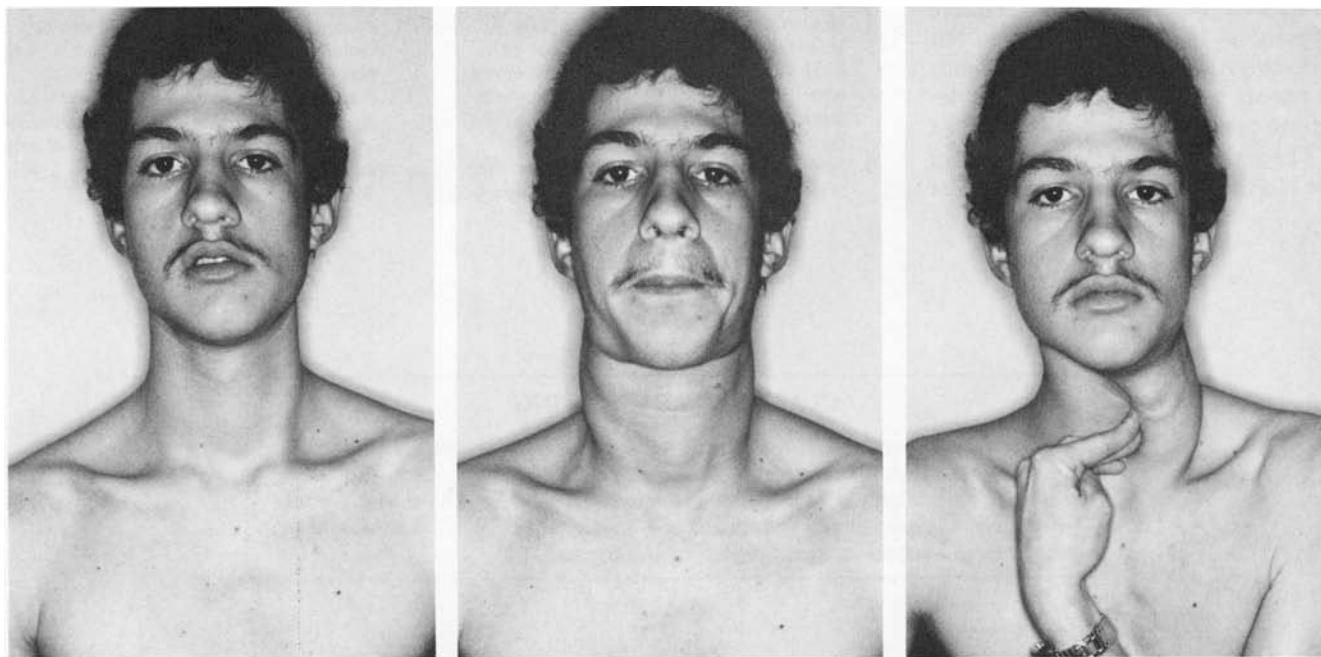
incidence of these problems in wind instrument players. While the general subject of laryngoceles has received wide attention in the otolaryngologic literature, the subject of hypopharyngeal dilatation has not. The literature reviewed revealed that, for all practical purposes, dilatation of the hypopharynx has not been written about other than as it involves hypopharyngeal or Zenker's diverticulum. Faced with this lack of information about hypopharyngeal dilatation in brass and reed instrument players, we undertook interviewing a number of professional musicians in teaching and performing roles for information concerning this problem. This paper presents the patient and treatment and the results of the interviews conducted with these

professional musicians. From this, we were able to pinpoint etiologies and suggest treatment for this unusual disease entity.

With the exception of Zenker's diverticulum, pharyngeal diverticulum and dilatation have received little attention in the otolaryngologic literature. Only about 20 cases have been reported in the English literature, and even in these much confusion is present concerning the differentiation between acquired or congenital diverticula and pharyngocele (pharyngeal dilatation). Very few cases occurring in wind instrument musicians have been reported. On the other hand, laryngoceles have been widely discussed with specific regard to wind instrument musicians.¹

Presented and included in the Proceedings of the Eighteenth Pan American Congress in Otorhinolaryngology and Bronchoesophagoscopy, San Juan, Puerto Rico, November 2-6, 1982.

Dr. Richard Smith is a private practitioner, Otolaryngology, in Maple Heights, Ohio. Dr. Howard Levine is a staff physician in the Department of Otolaryngology and Communicative Disorders at the Cleveland Clinic Foundation, Cleveland, Ohio. Address correspondence to Dr. Levine, The Cleveland Clinic Foundation, Cleveland, OH 44106.



Figures 1 and 2. The patient before (left) and during (center) modified Valsalva maneuver. Figure 3 (right). Manual displacement of the larynx.



Figure 4 (left). Xeroradiograph showing massive hypopharyngeal dilatation. Figure 5 (right). Telescopic view of dilated hypopharynx.

Case Report

A 16-year-old male was referred to the Cleveland Clinic Foundation with a six-month history of a moderately painful bulging of both sides of the neck which was present when he played the trumpet. He was a serious student of the trumpet, often practicing six hours each day and playing in three different musical groups. The enlargement of his neck had been progressive and always bilateral. When he was seen in our office, it was of remarkable size. He described a dull, muscular ache in the anterior neck after practice sessions, which when severe included a mild degree of odynophagia. The symptoms, however, were of short duration, lasting only a few hours after playing. He denied dysphagia, regurgitation, or aspiration and, in fact, stated that he was seeking medical attention only because the enlargement had progressed to such a degree that it was becoming embarrassing. In addition, he noted that he could push the larynx to either side of his neck to what he considered a much greater degree than normal. Of note in the history was the fact that he lifted weights frequently, and this also caused his neck to enlarge during the Valsalva maneuver, which is necessary in this activity.

The physical examination initially revealed no unusual physical findings. However, when the patient performed a modified

Valsalva maneuver (open glottis), a massive bilaterally symmetrical enlargement of his neck was noted (Figs. 1 and 2). In addition, the tissues in his neck were so lax that he was able to manually displace his larynx laterally approximately 6 cm to either side (Fig. 3). The mirror examination of the larynx was unremarkable. Initially, massive bilateral laryngoceles were suspected, but anteroposterior and lateral xeroradiograms disclosed massive hypopharyngeal dilatation without laryngeal abnormality (Figs. 4 & 5). The patient was examined again and instructed to perform a modified Valsalva maneuver over a Hopkins' right-angle telescope, at which time the massive hypopharyngeal dilatation could clearly be seen and photographed (Fig. 6). The entire hypopharynx was involved, and the dilatation was not present during a Valsalva against a closed glottis. The diagnosis was hypopharyngeal dilatation. The cause of this patient's problem appeared to be increased intrapharyngeal pressure while playing the trumpet, possibly combined with an abnormal tissue laxity (although he displayed essentially no signs of connective tissue disease such as Ehlers-Danlos syndrome). The authors' initial recommendation was that the patient cease his instrumental study. He was, however, unwilling to do this and, therefore, was referred to the Physical Medicine Department at the Cleveland Clinic Founda-

tion for treatment. The recommendations of that department included the prescription of exercise to strengthen the cervical musculature including the platysma, upper trapezius, and sternocleidomastoid muscles, and the construction of a soft cervical collar to be worn while playing the trumpet. The collar was sufficiently thin so that it could be worn under clothing during performances.

After several months of the use of the collar and the strengthening exercises the patient reported that his neck enlargement had decreased slightly and that associated muscular discomfort had diminished remarkably.

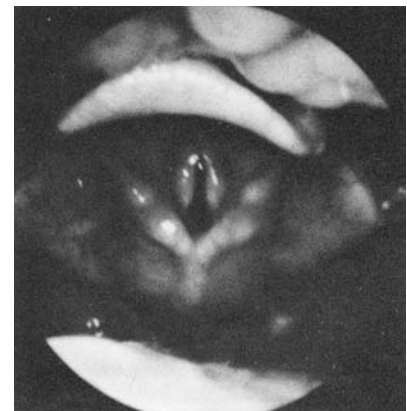


Figure 6. Hypopharyngeal dilatation.

Literature Review

The first account of a pharyngeal enlargement or diverticulum was given by Ludlow in 1764² and shortly thereafter by Bell in 1817.³ Halstead gave a more complete discussion in 1904, and though these accounts as well as the vast majority of subsequent accounts were chiefly concerned with the abnormality commonly called Zenker's or hypopharyngeal diverticulum, they did much to further our understanding of the pharynx and its musculature.

In 1952 Atkinson coined the term pharyngocele to describe a marked and occasionally symptomatic enlargement of otherwise normal pyriform fossae in his review of pharyngeal diverticula.⁴ He identified particular areas of weakness in the pharyngeal wall and in particular discussed dilatations produced by inflation, in this case without particular reference to wind instrumentalists. He did, however, investigate a small series of musicians without reporting his results. His subjects often reported headache and neck pain as symptoms.

The authors were able to locate two references that mention this abnormality in wind instrument musicians. The first was MacFie's monograph on laryngoceles in wind instrument bandmen.¹ He found that laryngocele was present in approximately half of the subjects he studied. In addition, he noted a number of cases in which he found what he described as "abnormal bulging of the pharyngeal walls." There is no further description presented, but of note is the observation by MacFie that his patients could demonstrate their laryngoceles much better by Valsalva maneuver with an open glottis. He concluded that the status of the constrictor muscles of the false cords were of importance in this case because with the glottis closed they help to restrict the flow of air into the laryngocele. This leads us to wonder whether a component of pharyngeal dilatation was present in these patients as well.

Bachman et al. discussed lateral pharyngeal diverticula in 1968 and presented an excellent review of the anatomy as it pertains to this problem.⁵ They report three cases. They were of the opinion that pharyngeal pouches in younger patients represented the result of forceful exhalation or inflation of the pharynx and men-

tion specifically the playing of wind instruments as a possible etiology. They noted dilatations only in the pyriform fossae and ascribed these in part to the effects of elevated intrapharyngeal pressure on weakened thyrohyoid membranes. They reported two cases of pharyngeal pouches in trumpet players, both of which were unilateral. Their subjects also complained of pain and reported dysphagia and hoarseness. They noted that differentiation of pharyngeal diverticulum from simple pharyngeal enlargement in the pyriform area could be difficult but offered no guidelines for the physician.

Review of Hypopharyngeal Anatomy

The anatomy of the pharynx and hypopharynx is such that several areas of potential weakness exist which may contribute to pharyngeal dilatation-diverticulum, and a brief review is in order. The hypopharynx is arbitrarily divided from the oropharynx by the so-called pharyngoepiglottic fold which extends from the lateral epiglottic tip to the lateral pharyngeal wall. Above this the pharyngeal wall consists of the tonsillar fascia and two flat muscle bundles, the palatopharyngeus, and superior constrictors. The thinness of these muscles limits the intrinsic strength of the oropharyngeal wall. However, dilatations or diverticula in this area have not been reported except for those induced manually for the purpose of smuggling.⁴ In this case, diverticula were induced manually by the insertion of a digit to apply constant pressure until such time as the pouches became large enough to hold a small leaden egg. In this manner diverticula could be produced which were sufficiently large to hold several large golden coins.

Below the pharyngoepiglottic folds are found the pyriform recesses which comprise the lateral compartments of the hypopharynx. The walls of these recesses consist of a fibrous sheath above, the thyrohyoid membrane and ligament, and the middle and lower constrictors. The constrictor muscles tend to overlap, thereby producing areas of the thyrohyoid membrane which are unsupported. These areas are marked by the passage of the superior laryngeal artery and vein and the internal branch of the superior laryngeal nerve. These areas vary in size in each individual and

hence in potential for enlargement. In addition, gaps have been described between the middle and superior constrictor muscles. The area of dehiscence posteriorly between the cricopharyngeus and inferior constrictor has already received much attention and is well described in the literature. Considering the thinness of the pharyngeal musculature, the fact that it does not attenuate more readily than is observed is indeed remarkable.

Discussion

It appears that this patient's problems were caused by stretch of the pharyngeal wall secondary to elevated intrapharyngeal pressure while playing the trumpet. In addition, this may have been aggravated by weight lifting which includes repeated Valsalva maneuvers. Because the patient was unwilling to cease his playing, and faced with the lack of information concerning this clinical entity, the authors interviewed a number of prominent wind instrumentalists who are professional performers as well as instructors. A number of interesting points regarding breathing technique, instrument type, sound production, and general technique emerged.

Not all wind instruments require an equivalent physical effort to produce sound. Double reed instruments, such as the oboe and the bassoon, require sustained, moderately high mouth pressures to maintain the necessary airflow through the narrow aperture between the two reeds. The musicians we interviewed were unanimous in their opinion that students of these instruments are the most likely to develop symptoms related to their playing, including neck enlargement, headache, and even elevated blood pressure.

Requiring less pressure at the embouchure (the shaping of the lips and tongue while playing a wind instrument) are the large brass instruments (tuba, trombone). However, they can require large volumes of air, particularly when a forte passage is required. The mouth pressure requirements for playing the smaller brasses (cornet, trumpet, French horn) vary enormously and can reach exceedingly high values while playing a sustained, loud, high-pitched note. Thus, these instruments also have the potential of causing difficulty because of intermittent elevated intrapharyngeal pressure.

The single reed instruments such as the clarinet and saxophone require less pressure still and therefore probably do not pose any problem. Those instruments requiring the least force are the flute and piccolo. Curiously, bagpipes, an instrument that has been implicated in the past as causing difficulty because of the elevated pressures thought necessary to play it, require very little intrapharyngeal pressure, as the force necessary to drive the pipes is provided by the arm of the player, although very large volumes of air are needed to maintain the bag in an inflated state.

All of those musicians interviewed agreed that some expansion of the neck while playing is normal and, other than requiring a loosening of the collar occasionally, produces no untoward symptoms. Again, there was consensus that this tendency is most evident in the double reed instrumentalist. This suggests to us that a significant degree of hypopharyngeal dilatation exists in many wind instrument musicians without producing symptoms, a question we are currently investigating. None of the musicians interviewed had heard of a case as severe as our patient's.

Another point that was emphasized by those we interviewed, particularly as regards teaching of an instrument, was the importance of breathing technique. What was described is essentially the same technique as that used by professional singers. Three points

emerged. The first was that excessive pressure can be produced when too much breath is taken before playing a passage; this tends particularly to occur before a long passage. This practice should be discouraged, and with experience a player can be expected to meter his breathing accordingly. Second, and again as in the professional singer, the manner in which the breath is produced and from which part of the chest it is exhaled (points often mentioned in the training of a professional singer but difficult to describe physiologically) also play an important role in the creation of excessive pressure at the embouchure. Third, the breath must not be held for a period of time before playing commences, as any pause against a closed embouchure also produces excessively elevated intrapharyngeal pressures. Excessive volumes, particularly in brass players, should be discouraged. Students who describe headache or other symptoms should be instructed to reduce their practice time or change to an instrument requiring less pressure. Enlarging the mouthpiece (and therefore the instrument) has been reported to decrease effort by as much as 50 percent;⁶ this is the primary reason for recommending a change to a larger instrument.

Conclusion

Hypopharyngeal dilatation is probably a common occurrence among wind

instrument musicians but, with proper training and technique, rarely if ever reaches the degree seen in our patient, or even a symptomatic degree. Professional music instructors emphasize numerous points in technique to prevent this occurrence. This information is presented because the otolaryngologist may be consulted by an aspiring or established musician with difficulty similar to our patient's, and a knowledge of the physiology involved may be of immeasurable use. A relatively few points concerning technique may do much to assist a career. In addition, physical medicine methods may be of assistance and should be considered. We are currently investigating a series of musicians to determine the extent of this problem.

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